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From Fields to Frontiers: India's Unstoppable Rise in Rice

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Rice (*Oryza Sativa* L.) is a major cereal crop at national and world level belongs to Gramineae family and known as Paddy in English, Dhan in Hindi, Nel in Tamil, Nellu in Malayalam, Bhatta in Kannada, Jiri or Johana in Punjabi, and Dangar in Gujarati. Rice is originated from Southeast Asia, particularly in the Indian subcontinent and the Yangtze River region of China around 10,000 years ago. Its seed is known as spike which is rich in Calories, Carbohydrate, protein, Fat and many nutrients including magnesium, phosphorus, manganese, selenium, iron, folic acid, thiamin and niacin; but it is low in fiber and fat. Rice is a major staple food grain crop of over half of the world population, specially in Asia and south Asia contingent. It belongs to genus Oryza which in consist 25 identified species including *O. sativa* L., *O. nivara* Sharma et Shastry, *O. rufipogon* Griff., *O. meridionalis* Ng, *O. glumaepetula* Steud., *O. glaberrima* Steud., *O. barthii* A. Chev. et Roehr, *O. longistaminata* A. Chev. et Roehr., *O. punctata* Kotschy ex Steud., *O. rhizomatis* Vaughan, *O. minuta* J.S.Pesl. ex C.B. Pres, *O. malamphuzaensis* Krishn. et Chandr., *O. officinalis* Wall. ex Watt, *O. eichingeri* A. Peter, *O. latifolia* Desv., *O. alta* Swallen, *O. grandiglumis* (Doell) Prod., *O. australiensis* Domin., *O. schweinfurthiana* Prod., *O. granulata* Nees et Arn. ex Watt, *O. meyeriana* (Zoll. et Mor. ex Steud.) Baill, *O. longiglumis* Jansen, *O. ridleyi* Hook. f., *O. brachyantha* A. Chev. et Roehr., and *O. schlechteri* Pilger. Out of 25 rice identified species, of which 23 are wild species and two, *O. sativa* and *O. glaberrima* are cultivated. Its showed rice richness in agrobiodiversity and out of two cultivated species, *O. sativa* is the most widely grown species. It is grown worldwide including in Asian, North and South American, European Union, Middle Eastern and African countries. However, *O. glaberrima* is grown solely in West African countries.

Area and Production

In 2022–2023, India had the largest area for rice growing, with over 47 million hectares, followed by China with about 30 million hectares. Together, India and China grow more than half of the world's rice. Other major rice-growing countries include Bangladesh, Indonesia, Vietnam, and Thailand. It showed India's role as frontiers at farm level and India has a long history of rice cultivation at national and international level.

When we look at rice production across the world for the 2024–25 period, it is clearly indicated that Asia leads the way—especially India and China. These two countries are at the top, each growing 27% of the world's rice. India produced 149 million metric tons, just ahead of China's 145.28 million metric tons. Together, both the countries dominate global rice production and it showed India's role as frontiers in rice production globally. Following them are Bangladesh (7%), Indonesia (6%), Vietnam (5%), and Thailand (4%). These Southeast Asian nations also grow a large share of the world's rice, playing a big role in feeding millions population. The Philippines, Myanmar (Burma), Pakistan, and Cambodia each grow about 2% of the global total. Almost all major rice-growing countries are in Asia, showing its important role for the world's rice needs. . Globally, the scale of rice production varies a lot—from India's 149 million metric tons to Cambodia's 8.47 million—proving that both large and small player's matter. It showed, India's rise in rice is not just strong—it's unstoppable.

Institutes related to rice research

Globally, the International Rice Research Institute (IRRI), located in Los Baños, Philippines, stands as the foremost organization dedicated to rice science. IRRI works to reduce poverty, hunger, and malnutrition by improving the productivity, quality, and sustainability of rice farming systems. At the Asian regional level, the IRRI's South Asia Regional Centre (ISARC), located in Varanasi, India, contribute significantly to rice research and development. At the national level, India has two major institutions leading rice research and development: the ICAR-Central Rice Research Institute (ICAR-CRRI) in Cuttack, Odisha, and the ICAR-Indian Institute of Rice Research (ICAR-IIRR) in Hyderabad, Telangana. It plays a crucial role in improving rice yields and quality across diverse agro-ecological regions in India.

From "Jai Jawan Jai Kisan" to "Jai Jawan Jai Kisan Jai Vigyan Jai Anusandhan": A Journey of India's Rise in Rice

India's journey in rice production is deeply connected with its history, struggles, and the spirit of self-reliance. In 1965, at a time when India was facing a war with Pakistan and severe food shortages, the then Prime Minister Shree Lal Bahadur Shastri gave the inspiring slogan "Jai Jawan Jai Kisan"—*Hail the Soldier, Hail the Farmer*. It was a call to the soldiers protecting our borders and the farmers working in the fields, encouraging both to serve the nation with dedication. At that time, India's rice production stood at only 30.589 million metric tons, and food security was a major national challenge.

Some Decades later, under the able leadership of Honourable Prime Minister Shri Narendra Modi, the slogan has evolved into "Jai Jawan, Jai Kisan, Jai Vigyan, Jai Anusandhan"—*Hail the Soldier, the Farmer, Science, and Research*. This modern version reflects how far India has come and the new pillars supporting its agricultural revolution, especially in rice. Today, India is not only self-sufficient but surplus in rice production,

reaching 149 million metric tons in 2024–25. This transformation from dependency to global leader is truly a journey *from fields to frontiers*.

- "Jai Jawan" reminds us that food security is closely tied to national security. A stable and strong rice production system ensures the country's internal stability and reduces dependence on imports, helping build a resilient India.
- "Jai Kisan" continues to honor the hardworking farmers who are the backbone of our agricultural economy. In states like Meghalaya and across the Northeast, rice is more than a crop—it is a way of life. Policies like Minimum Support Price (MSP), better irrigation, insurance, and market access have empowered farmers and boosted production.
- "Jai Vigyan" brings in the role of science in modernizing rice farming. Scientific research has led to the development of high-yielding, pest- and climate-resistant rice varieties, and adoption of advanced tools like drones, soil health testing, and remote sensing. These innovations are helping farmers grow more with fewer resources.
- "Jai Anusandhan" looks to the future, where research continues to drive sustainability and innovation. Techniques like System of Rice Intensification (SRI), Direct Seeded Rice (DSR), organic farming, and crop residue management are making rice farming more efficient and eco-friendly. Even by-products like rice husk and straw are being turned into useful materials, showing the power of innovation in every grain.

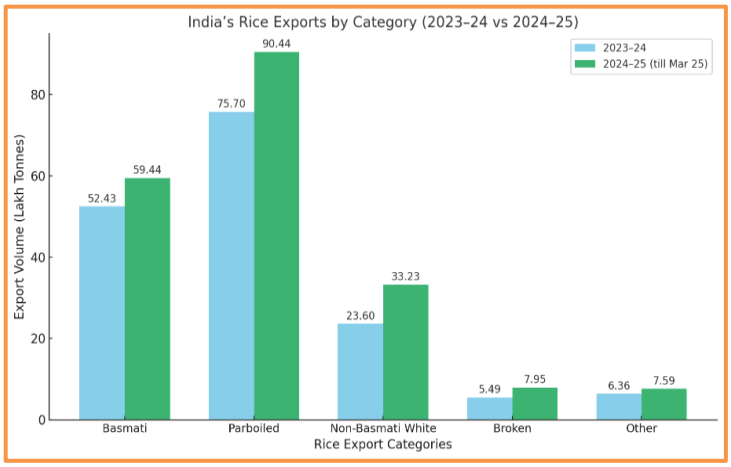
Together, these four pillars—soldiers, farmers, science, and research—have shaped India's unstoppable rise in rice. From a struggling nation in the 1960s to a global leader in 2025, India's rice journey is a shining example of resilience, vision, and transformation. As we move forward, this spirit will continue to lead us from our rich agricultural fields to global frontiers.

Recent Development in India's Rice Research

India's rice sector has recently made significant steps through cutting-edge research and innovation. Two major genome-edited rice varieties, DRR Rice 100 (Kamala) and Pusa DST Rice 1, have been developed to boost rice productivity and climate resilience. DRR Rice 100, created by ICAR-IIRR Hyderabad using the popular Samba Mahsuri variety, helps increase grain yield while reducing methane emissions. Pusa Rice DST1, developed by ICAR-IARI New Delhi based on MTU 1010, offers enhanced drought and salt tolerance, with a potential yield increase of up to 30.4% in saline-alkaline soils. These innovations mark a bold step toward sustainable, climate-smart, and resource-efficient rice farming, emphasizing India's leadership in rice science and production. These two rice varieties were released by Shri Shivraj Singh Chouhan, Honourable Union Minister of Agriculture and Farmers Welfare, Govt of India, on 4th April 2025 at ICAR, New Delhi. This once again highlights India's global leadership in the field, as both varieties were developed using the CRISPR technology and first time in the world such rice varieties have been created using this advanced technology.

India's Rice Economy

India's rice exports reached a significant milestone in the fiscal year 2024–25, with a total shipment of 198.65 lakh tonnes (19.86 million tonnes) recorded by March 25, 2025, according to government data presented in the Rajya Sabha. This figure surpassed the entire rice export volume of the previous fiscal year 2023–24, which stood at 163.58 lakh tonnes. Between April 1, 2024, and March 25, 2025, the export composition



included 59.44 lakh tonnes of basmati rice, 90.44 lakh tonnes of parboiled rice, 33.23 lakh tonnes of non-basmati white rice, 7.95 lakh tonnes of broken rice, and 7.59 lakh tonnes of other rice varieties. In comparison, during 2023–24, India had exported 52.43 lakh tonnes of basmati rice, 75.7 lakh tonnes of parboiled rice, 23.6 lakh tonnes of non-basmati white rice, 5.49 lakh tonnes of broken rice, and 6.36 lakh tonnes of other rice types. India produces approximately 50–60 lakh tonnes of broken rice annually, which plays a crucial role in various industries. Broken rice serves as a key input for poultry and livestock feed, and it is also used as feedstock in grain-based distilleries for ethanol production. This ethanol is subsequently supplied to Oil Marketing Companies (OMCs) for blending with petrol, thereby contributing positively to both the energy and agricultural sectors. According to the Directorate General of Commercial Intelligence and Statistics, India earned more than $12.47 billion from rice exports in the fiscal year 2024–25, marking a 20% rise compared to the previous year and reaffirming its position as the world's leading rice exporter. The top rice-producing exporting states in India include West Bengal, Uttar Pradesh, Punjab, Andhra Pradesh, and Odisha. Punjab and Haryana is renowned for its premium Basmati rice production and export. India's basmati rice exports have proven highly lucrative, generating an estimated $5.2 billion between April 2023 and February 2024. As a major global exporter of basmati rice, India maintains strong market presence in key regions such as the United States and West Asia.

Conclusion

India's journey in rice is a story of strength, progress, and change. From facing food shortages in the 1960s to becoming the world's top rice producer and exporter in 2025, the country has made big achievements in farming. With the support of key institutes like ICAR-CRRI and ICAR-IIRR, groundbreaking research such as CRISPR-Cas9 genome-edited varieties, and dedicated farmers across diverse regions, India has built a model of sustainable and high-tech agriculture. The country's surge in rice exports, enhanced productivity, and commitment to climate-smart practices showcase its global leadership. This journey—from traditional farms to modern innovation—is truly from fields to frontiers: India's unstoppable rise in rice.